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Docket No.: 0283-0225PUS1  
(PATENT)

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Patent Application of:  
Shigeyoshi NISHINO et al.

Application No.: 10/583,562

Confirmation No.: N/A

Filed: June 19, 2006

Art Unit: N/A

For: PROCESSES FOR PREPARING  
TETRAHYDROPYRAN-4-ONE AND PYRAN-  
4-ONE

Examiner: Not Yet Assigned

**LETTER**

Commissioner for Patents  
P.O. Box 1450  
Alexandria, VA 22313-1450

Sir:

Subsequent to the filing of the above-identified application on June 19, 2006, attached hereto is a Transmittal (Form PCT/IB/338) submitted with the International Preliminary Report on Patentability (Form PCT/IB/373), and an English translation of the Written Opinion Of The International Searching Authority (Form PCT/ISA/237) that should be made of record in the present application.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or to credit any overpayment to Deposit Account No. 02-2448 for any

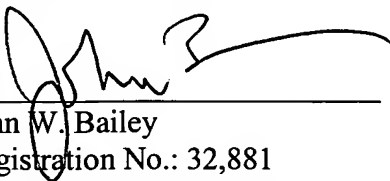
Application No.: 10/583,562

Docket No.: 0283-0225PUS1

additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Dated: September 26, 2006

Respectfully submitted,

By   
\_\_\_\_\_  
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Attachment(s)

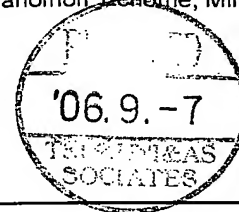
From the INTERNATIONAL BUREAU

**PCT**

NOTIFICATION OF TRANSMITTAL  
OF COPIES OF TRANSLATION  
OF THE INTERNATIONAL PRELIMINARY REPORT  
ON PATENTABILITY  
(CHAPTER I OR CHAPTER II  
OF THE PATENT COOPERATION TREATY)  
(PCT Rules 44bis.3(c) and 72.2)

To:

TSUKUNI, Hajime  
SVAX TS Bldg., 22-12, Toranomon 1-chome, Minato-ku,  
Tokyo  
1050001  
JAPON



Date of mailing (day/month/year) 31 August 2006 (31.08.2006)	
Applicant's or agent's file reference FP2716PCT	<b>IMPORTANT NOTIFICATION</b>
International application No. PCT/JP2004/018949	International filing date (day/month/year) 17 December 2004 (17.12.2004)
Applicant UBE INDUSTRIES, LTD. et al	

## 1. Transmittal of the translation to the applicant.



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter I).



The International Bureau transmits herewith a copy of the English translation of the international preliminary report on patentability (Chapter II).

## 2. Transmittal of the copy of the translation to the designated or elected Offices.

The International Bureau notifies the applicant that copies of that translation have been transmitted to the following designated or elected Offices requiring such translation:

None

The following designated or elected Offices, having waived the requirement for such a transmittal at this time, will receive copies of that translation from the International Bureau only upon their request:

AE, AG, AL, AM, AP, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EA, EC, EE, EG, EP, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OA, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SM, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW

## 3. Reminder regarding translation into (one of) the official language(s) of the elected Office(s).

The applicant is reminded that, where a translation of the international application must be furnished to an elected Office, that translation must contain a translation of any annexes to the international preliminary report on patentability (Chapter II).

It is the applicant's responsibility to prepare and furnish such translation directly to each elected Office concerned within the applicable time limit (Rule 74.1). See Volume II of the PCT Applicant's Guide for further details.

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer  Yoshiko Kuwahara
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## PATENT COOPERATION TREATY

## PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY  
(Chapter I of the Patent Cooperation Treaty)

(PCT Rule 44bis)

Applicant's or agent's file reference FP2716PCT	<b>FOR FURTHER ACTION</b> See item 4 below	
International application No. PCT/JP2004/018949	International filing date ( <i>day/month/year</i> ) 17 December 2004 (17.12.2004)	Priority date ( <i>day/month/year</i> ) 19 December 2003 (19.12.2003)
International Patent Classification (8th edition unless older edition indicated) See relevant information in Form PCT/ISA/237		
Applicant UBE INDUSTRIES, LTD.		

1. This international preliminary report on patentability (Chapter I) is issued by the International Bureau on behalf of the International Searching Authority under Rule 44 bis.1(a).
2. This REPORT consists of a total of 6 sheets, including this cover sheet.  
  
In the attached sheets, any reference to the written opinion of the International Searching Authority should be read as a reference to the international preliminary report on patentability (Chapter I) instead.
3. This report contains indications relating to the following items:

<input checked="" type="checkbox"/> Box No. I	Basis of the report
<input type="checkbox"/> Box No. II	Priority
<input checked="" type="checkbox"/> Box No. III	Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
<input checked="" type="checkbox"/> Box No. IV	Lack of unity of invention
<input type="checkbox"/> Box No. V	Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
<input type="checkbox"/> Box No. VI	Certain documents cited
<input type="checkbox"/> Box No. VII	Certain defects in the international application
<input checked="" type="checkbox"/> Box No. VIII	Certain observations on the international application
4. The International Bureau will communicate this report to designated Offices in accordance with Rules 44bis.3(c) and 93bis.1 but not, except where the applicant makes an express request under Article 23(2), before the expiration of 30 months from the priority date (Rule 44bis .2).

The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland  Facsimile No. +41 22 338 82 70	Date of issuance of this report 22 August 2006 (22.08.2006)
	Authorized officer  Yoshiko Kuwahara  e-mail: pt07@wipo.int

# PATENT COOPERATION TREATY

TRANSLATION

From the  
INTERNATIONAL SEARCHING AUTHORITY

## PCT

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

(PCT Rule 43bis.1)

To:

Date of mailing  
(day/month/year)

Applicant's or agent's file reference

**FP2716PCT**

**FOR FURTHER ACTION**

See paragraph 2 below

International application No.

**PCT/JP2004/018949**

International filing date (day/month/year)

**17.12.2004**

Priority date (day/month/year)

**19.12.2003**

International Patent Classification (IPC) or both national classification and IPC

Applicant

**UBE INDUSTRIES, LTD.**

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☒ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability: citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☐ Box No. VII Certain defects in the international application
- ☒ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA") except that this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notified the International Bureau under Rule 66.1bis(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of 3 months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA/JP

Authorized officer

Facsimile No.

Telephone No.

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/018949

Box No. I

Basis of this opinion

1. With regard to the language, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.  
☐ This opinion has been established on the basis of a translation from the original language into the following language \_\_\_\_\_, which is the language of a translation furnished for the purposes of international search (under Rule 12.3 and 23.1(b)).
2. With regard to any nucleotide and/or amino acid sequence disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:
  - a. type of material  
☐ a sequence listing  
☐ table(s) related to the sequence listing
  - b. format of material  
☐ in written format  
☐ in computer readable form
  - c. time of filing/furnishing  
☐ contained in the international application as filed.  
☐ filed together with the international application in computer readable form.  
☐ furnished subsequently to this Authority for the purposes of search.
3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table(s) relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.
4. Additional comments:

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/018949

Box No. IV Lack of unity of invention

1. ☒ In response to the invitation (Form PCT/ISA/206) to pay additional fees the applicant has:
- ☒ paid additional fees
  - ☐ paid additional fees under protest
  - ☐ not paid additional fees
2. ☐ This Authority found that the requirement of unity of invention is not complied with and chose not to invite the applicant to pay additional fees.
3. This Authority considers that the requirement of unity of invention in accordance with Rules 13.1, 13.2 and 13.3 is
- ☐ complied with
  - ☒ not complied with for the following reasons:

This application includes the following four inventions of: (1) claims 1-16 and 20, (2) claim 19, (3) claims 17, 18, 21, and 22, and (4) claims 23 and 24.

A compound of the formula (2), which is a starting compound in the production method described in claims 1, was already publicly known at the time of the filing of this application. The feature of this invention is considered to be not the use of the compound per se of the formula (2) as a starting material, but the method per se for producing a compound described in formula (1). However, a method for producing tetraphydophyran-4-one through reduction with hydrogen by a metal catalyst is already publicly known. Technical features of production methods (a) and (b) in claim 1 do not reside in the use of a metal catalyst, and the production methods (a) and (b) are separate inventions differing in the technical feature. Consequently, claim 1 includes two inventions relating to the production methods respectively described in claims 20 and 23.

Furthermore, claims 19 relate to a method for manufacturing the publicly known compound (2)', while the technical feature of claims 17, 18, 21 and 22 resides in the use of a compound of the formula (3) and different in technical feature from the invention described in claim 1. Therefore, there is no matter common among these claims which is considered as a special technical feature and no technical relationship in the meaning of PCT Rule 13 can be found among these claims.

4. Consequently, this opinion has been established in respect of the following parts of the international application:
- ☒ all parts
  - ☐ the parts relating to claims Nos. \_\_\_\_\_

WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/018949

Box No. V Reasoned statement under Rule 43bis.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Claims	1-24	YES
	Claims		NO
Inventive step (IS)	Claims	1-22, 24	YES
	Claims	23	NO
Industrial applicability (IA)	Claims	1-24	YES
	Claims		NO

2. Citations and explanations:

Document 1: R. CORNUBERT, et al., Bulletin de la Societe Chimique de France, 1950, pp. 36-40

Document 2: E. SORKIN, et al., Helvetica Chimica Acta, 1948, Vol. 31, pp. 65-75

Document 3: JP 63-170372 A

Document 4: Yoshiro OGATA, "Yuki Kagobutsu no Sanka to Kangen", 1964 nen, Kankodo Co., pp. 528-532, pp. 536-540

Document 5: JP 10-45660 A

Document 6: JP 7-145162 A

Claims 23 do not appear to involve an inventive step based on document 1 and 4. Document 1 describes a catalyst that contact reduces pyran-4-one with hydrogen. Moreover, as a metal for a hydrogen contact reduction catalyst, the one described in the specification is well-known (document 4), and using the catalyst for a more active anhydrous catalyst would be easily conceived by a person skilled in the art.

The inventions of claims 1-22 and 24 are not described in any of documents 1-6 cited in the ISR and would not be obvious to a person skilled in the art.

In particular, none of the documents suggest a manufacturing method superior in the yield of the generating a substance by using a reduction method using a mixed solvent of an alcohol solvent and an aromatic hydrocarbon in the presence of a palladium one-carbon metal and a catalyst reduction method which causes reaction in a hydrophobic solvent in the presence of an anhydrous metal catalyst adjusted by azeotropic dehydrating a hydrous metal catalyst.

Moreover, although documents 5 and 6, and the manufacturing method itself for a hetero ring from 1, 4 dicarbonyl compound by Paal-Knorr is well-known, it cannot be considered that an effective synthetic method of pyran-4-one from dicarbonyl compound is obvious from these methods.



WRITTEN OPINION OF THE  
INTERNATIONAL SEARCHING AUTHORITY

International application No.

PCT/JP2004/018949

Box No. VIII      Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:

With respect to the manufacturing method of claims 1-16 and 20, that the kinds of the metals and solvents to be used in a catalytic reduction with hydrogen using a metal catalyst differs greatly in yield etc. is a matter of technical common sense. However, the examples given in the specification is limited to ones in which an aromatic hydrocarbon such as toluene is used as the aprotic solvent, and no specific mode regarding the case in which the so-called polar aprotic solvent is used. With respect to the metal catalyst also, the examples are limited to ones where a specific metal is used.

Consequently, the inventions described in the above claims include a part which is not supported by the specification.